

A NEW *EUPOMPHA* FROM BAJA CALIFORNIA WITH
ADDITIONAL INFORMATION ON *E. DECOLORATA* (HORN)
(COLEOPTERA: MELOIDAE)¹

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A recent examination of miscellaneous Meloidae in the California Insect Survey Collection, University of California, Berkeley revealed eight individuals of a new *Eupompha*, herein named *E. vizcaina*. This series was collected by John T. Doyen in the spring of 1976 at Miller's Landing in the Vizcaino region of Baja California. A visit to the area in the spring of 1980 produced additional material. A description of the adult, first instar larva and courtship behavior of *E. vizcaina* is given below. A second Baja California species, *E. decolorata* (Horn) also was found. Its first instar larva and courtship behavior are also described.

Eupompha vizcaina and *E. decolorata* are the only *Eupompha* confined to Baja California. They apparently are restricted to the Vizcaino Desert in the central third of the peninsula. Adults of both species are synchronous. However, the few collections so far suggest habitat and plant host differences. *E. vizcaina* occurs on sand dunes where it feeds on flowers of *Sphaeralcea axillaris* Watson. *E. decolorata* appears to be more generally distributed off the dunes. Flowers of *Malacothrix californica* DC, *Encelia palmeri* Vasey and Rose and *Viguiera deltoidea* Gray are known food sources.

Eupompha vizcaina and *E. decolorata* belong to Section I of *Eupompha* as recently defined in the generic revision by Pinto (1979). However, they are not close relatives. *E. vizcaina* is placed in the Viridis Group with *E. edmundsi* (Selander) from northern Arizona and southern Utah and *E. viridis* (Horn), a Chihuahuan Desert species. *E. decolorata* was placed in the Elegans Group with two primarily southern California species, *E. elegans* (LeConte) and *E. imperialis* (Wellman), on the basis of adult anatomy (Pinto, 1979). Larval anatomy and courtship behavior (see below) corroborate this assignment.

***Eupompha vizcaina* Pinto, new species**
(Figs. 1, 2, 5, 6, 8, 9)

Adult.—Moderately robust. Surface shining. Color uniformly dark, brassy with virescent to purpurescent luster over most of body except abdominal terga I–VI more distinctly virescent, and eyes and antennae black; head without red spot on frons; wing membrane colorless to lightly infusate.

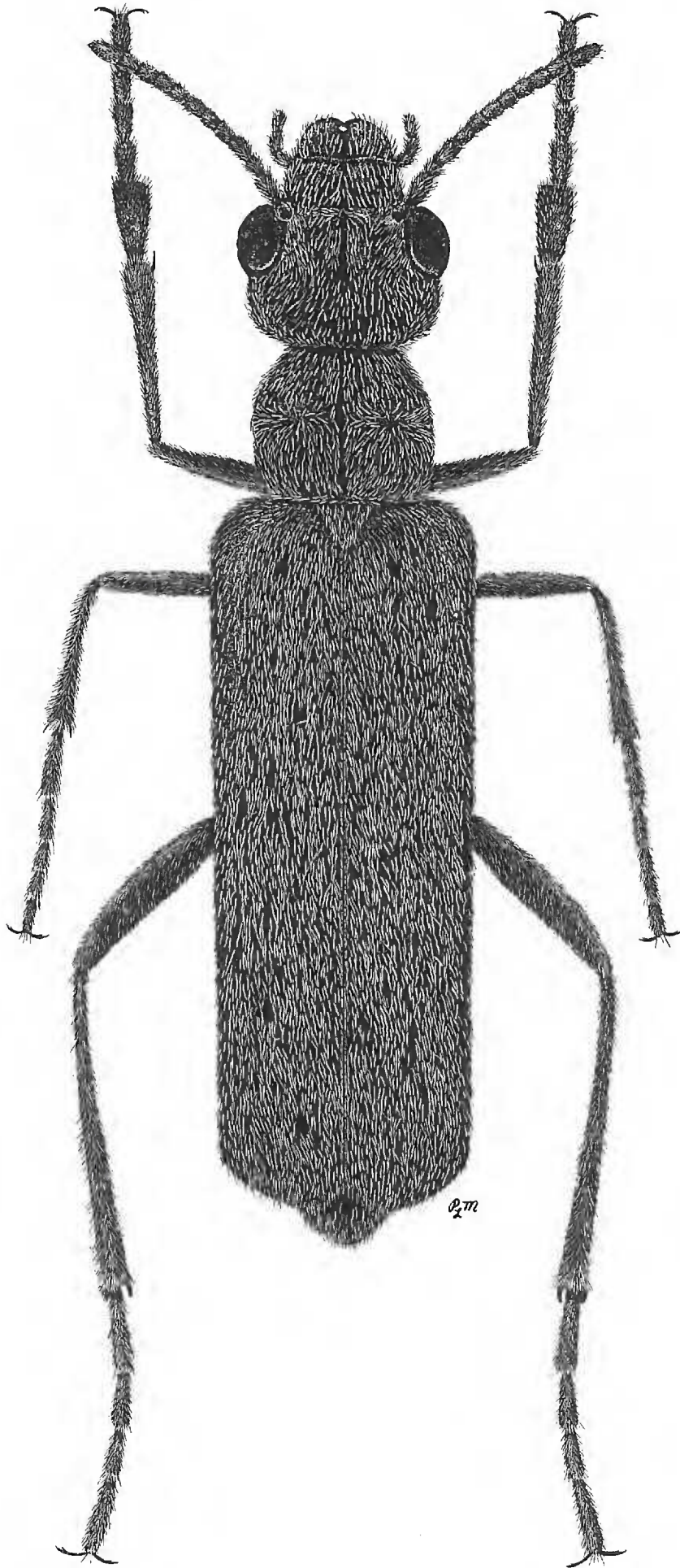


Fig. 1. *Eupompha vizcaina*, male.

Pubescence cinereous, coarse, moderately dense to dense throughout, noticeably affecting body color. Length from frons (head in hypognathous position) to apex of elytra 7.8 ± 0.2 (6–10) mm (N = 10).²

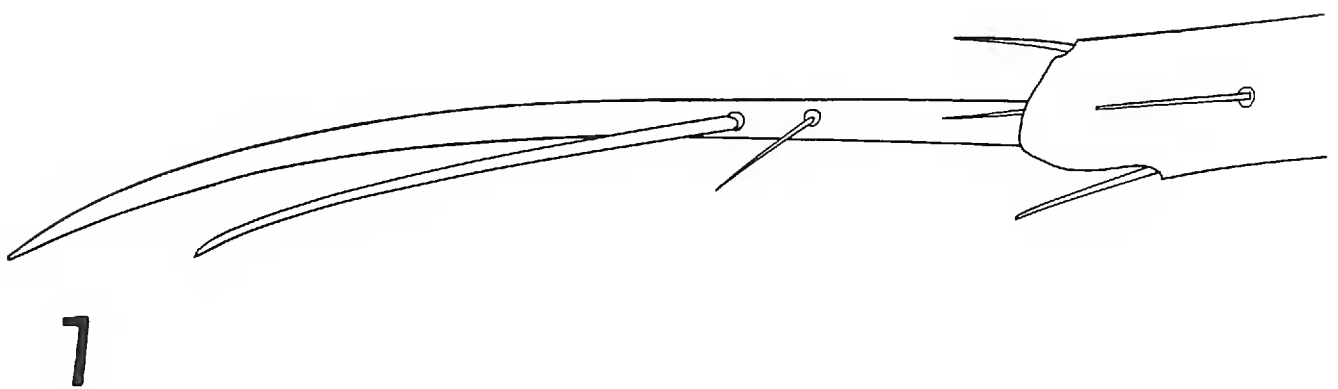
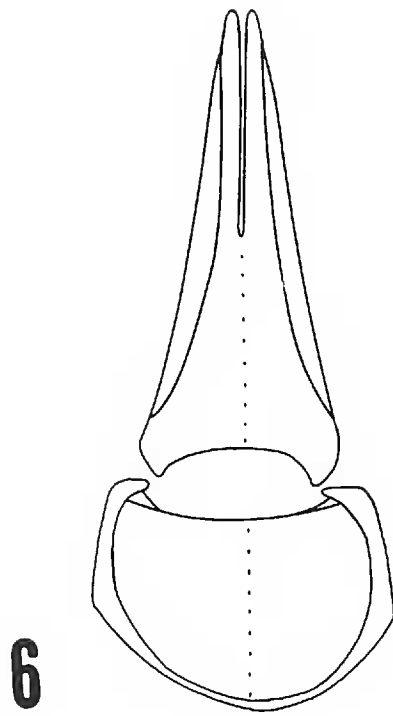
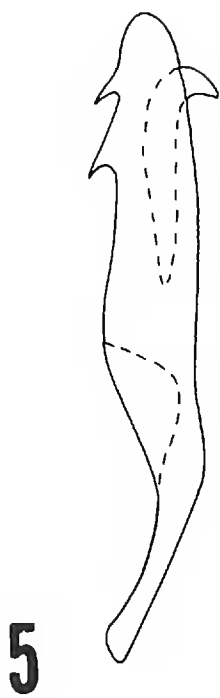
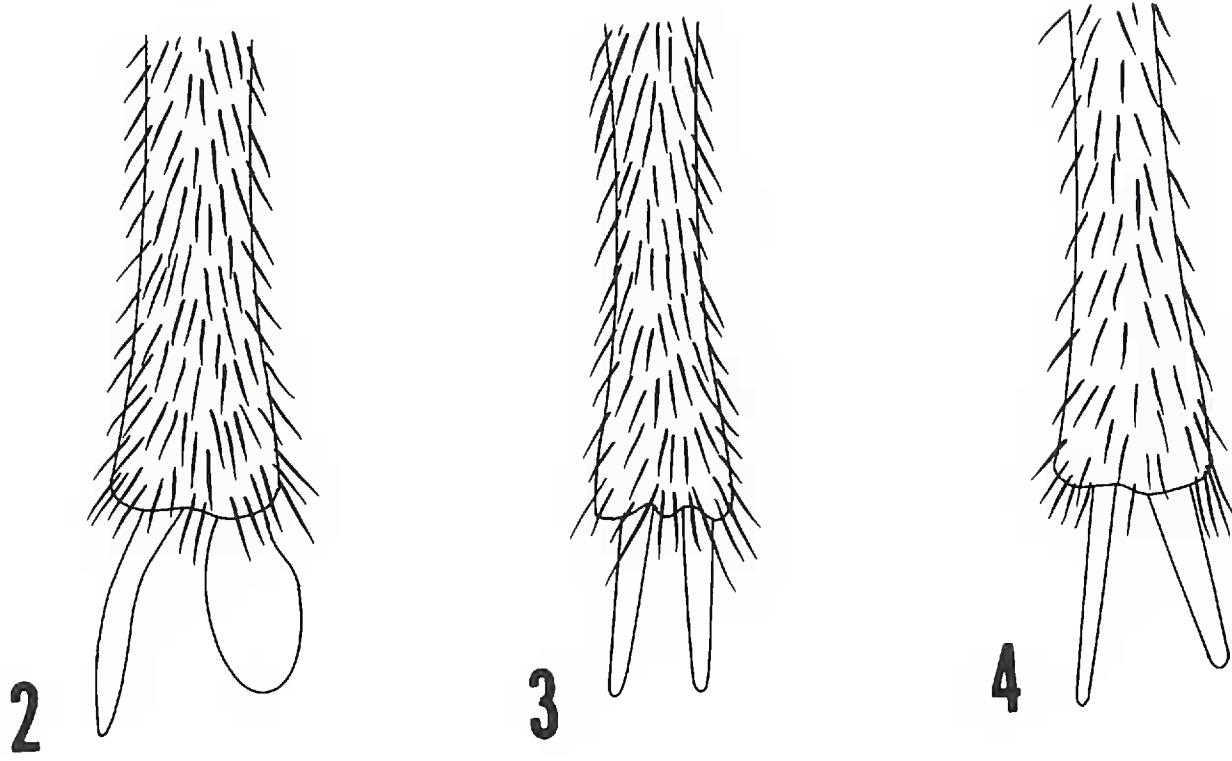
Head 0.76 ± 0.01 (0.7–0.8) (N = 10) as long as wide, subrectangular, widest at eyes; sides above eyes relatively straight; occiput straight to broadly arcuate; moderately densely punctate, center of head typically impunctate, or obsolescently so; surface between punctures microreticulate; male with a very shallow, oval, setate sulcus on frons between eyes rarely extending to epistomal suture, female with sulcus as well or almost as well developed; frontal area of male densely set with very small cuticular pores (visible with scanning electron microscope at $1000\times$). Eyes large, bulged, angularly emarginate anteriorly slightly above center, not noticeably narrower in dorsal half, ca. $\frac{3}{4}$ as wide as long, extending to a point $\frac{3}{5}$ the distance from epistomal suture to occiput. Antennae short, slightly compressed anteroposteriorly, not tapering apically, segment III ca. $\frac{4}{5}$ and $\frac{3}{4}$ as long as I in males and females, respectively; IV almost as wide as long, ca. $\frac{3}{4}$ as long as III, V–X ca. 1.10 as wide as long. Labial palpi with segment III subequal in length and width to II.

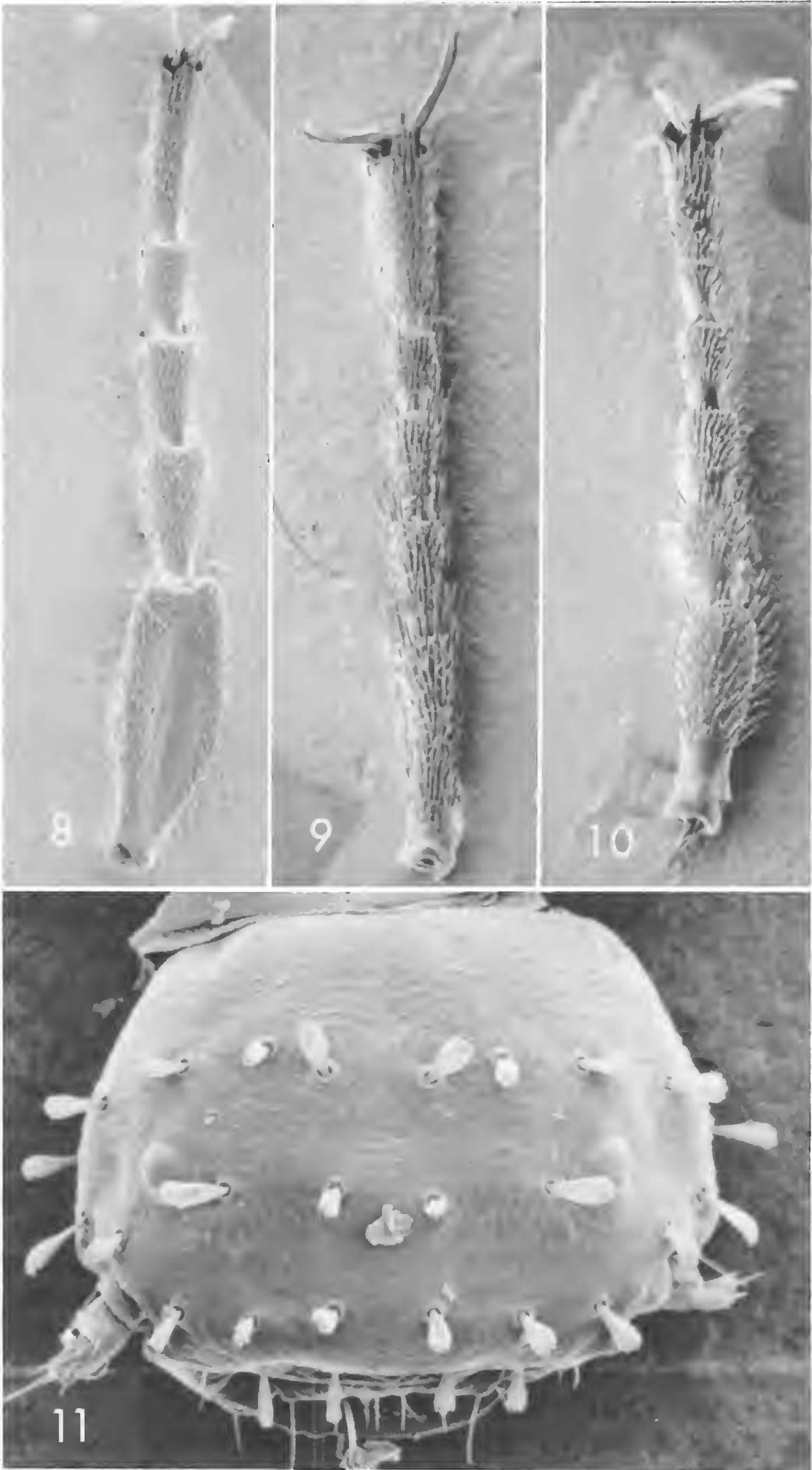
Pronotum usually very slightly longer than wide, 0.99 ± 0.01 (0.96–1.03) (N = 10) as wide as long; sides evenly convergent anteriorly and posteriorly from widest point in apical half; disk uneven, gradually declivent to posterior margin, with a broad, shallow, horizontal impression across apical third which often extends posteriorly at middle to center of disk, and a shallow, subtriangular impression at base; punctures and surface as on head, less densely punctate on either side of midline, setae directed posteriorly in apical third, anteriorly in basal third, swirled (variously directed) at center.

Elytra densely, moderately coarsely scabropunctate; setae recumbent, dense and partially obscuring cuticle. Venter with punctation similar to elytra except surface along midline of metasternum smoother and impunctate, setae longer than on dorsum. Legs with femora relatively slender, hind femora only slightly wider than middle femora; tibial spurs on fore and middle legs straight, spiniform, brown; spurs on hind tibiae pale yellow, inner spur blade-like, outer spur spoon-shaped (Fig. 2); fore tarsi (Fig. 8) of male with segments I–IV swollen, II–IV only slightly so, I almost half as wide as long, slightly longer than II and III combined; ventral surface of I distinctly concave, glabrous and impunctate along midline, dorsal surface not sulcate, II–V with moderately dense, short erect cinereous setae on venter; claws with

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Figs. 2–7. Figs. 2–4. Apex of left tibia (ventral view) in species of *Eupompha*. Fig. 2. *E. vizcaina*. Fig. 3. *E. decolorata*. Fig. 4. *E. edmundsi*. Figs. 5, 6. *E. vizcaina*, male genitalia. Fig. 5. Aedeagus. Fig. 6. Gonoforceps. Fig. 7. Hind claw of first instar larva of *E. vizcaina*.





curvature of ventral tooth slightly more abrupt than that of dorsal blade, apex of tooth falling short of apex of dorsal blade; onychium with three setae. Male genitalia (Figs. 5, 6) with posterior margin of basal piece slightly concave; aedeagus with dorsal spines small, ventral spine elongate, slender throughout. Female gonostyli moderately long.

First instar larva.—Light brown with head darker; venter with normal, elongate, spiniform setae throughout; dorsum with both very short, stout setae, and highly modified, elongate, clavacostate setae (Figs. 11, 12); modified setae somewhat shorter than unmodified homologues in other *Eupompha*. Modified setae distributed as follows. Head capsule: widespread except on labrum, also, lateral-most seta on first setal row behind labrum, seta posteromedial to eye and those on occiput normal; thorax: 3 on lateral margin of pronotum; on lateral and posterior margin of meso- and metanotum; a single seta at base of meso- and metacoxae; abdomen: on posterior margin of terga only. Unmodified dorsal setae stout, peg-like, much shorter (ca. $\frac{1}{5}$ as long) than homologues in other species.

Head (Fig. 11) 30% wider than long, widest near level of eyes; sides convergent to base; six setae between clypeus and frons (first row behind labrum); gula about as wide as long, its setae inserted on anterior margin; eyes subequal in diameter to mesothoracic spiracles. Antenna (Fig. 13) with segment I ca. twice as wide as long; II as wide as long, ca. twice as long as I; III twice as long as wide, subequal in length to II; sensory organ as wide as long, 20% shorter than III; terminal seta moderately long, 60% longer than III. Mandibles slender apically, abruptly widened at base; inner margin entire; apical seta twice as long as basal seta. Maxillae with ca. 5 setae at apex of mala; segment III of palpi ca. 40% longer than wide, asymmetrical, lateral margin distinctly longer than medial margin, sensory area with ca. 25 papillae, two-segmented appendix not present. Labrum with setae of first prementum long, seta of second prementum minute; segments I and II of palpi subequal in length.

Thorax with line of dehiscence confined to pro- and mesonotum and anterior fourth of metanotum; 26 setae on pronotal disk. Abdomen with posterolateral margin of terga abutting against pleurites; spiracles placed in membranous area between pleurites and anterolateral margin of terga; diameter of first spiracle ca. 20% less than that of mesothoracic spiracle and 75% greater than that of second spiracle, spiracles on segments II–VIII subequal in size; terga with posterior marginal row of setae ca. half tergum

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Figs. 8–11. Figs. 8–10. Fore tarsi (ventral view) of *Eupompha* spp. Fig. 8. *E. vizcaina*, male. Fig. 9. *E. vizcaina*, female. Fig. 10. *E. decolorata*, male. Fig. 11. Head (320×) of first instar larva of *E. vizcaina* showing distribution of clavacostate setae (artifact at center of photo).



Figs. 12, 13. First instar larva of *Eupompha vizcaina*. Fig. 12. Detail of a clavacostate seta from vertex of head (3200 \times). Fig. 13. Antenna (ventromedial view, 940 \times).

length; sternum with sclerites distinct on segments I–IX, those on I–VII small, paired, increasing in size on posterior segments; VIII and IX each with a single medial sclerite. Legs slender, hind claw (Fig. 7) long, broadly curved, ca. $\frac{3}{5}$ as long as hind tibia; claws with their two setae slightly but distinctly separated at base, longer seta not approaching apex of claw. Body length 1.25 mm, caudal setae 0.46 mm (N = 5).

Type information.—Holotype, adult male, from MEXICO, Baja California Sur, Vizcaino Peninsula, ca. 27°24'N, 114°05'W; 51 road km E Rancho San Jose Castro, 26 March 1980, dune association; on *Sphaeralcea axillaris*, J. D. Pinto, J. M. Mathieu, and E. M. Fisher; deposited in the collection of the California Academy of Sciences.

Geographic distribution.—Known from three locales in the Vizcaino Desert of central Baja California.

Records.—79 specimens as follows: MEXICO. *Baja California Norte*: Guerrero Negro, 9 km N, 13; Miller's Landing, 8. *Baja California Sur*: Rancho San Jose Castro, 51 road km E, 58.

Larval material examined.—Larvae from eggs laid by females collected at the type locality (see above). Five separate egg masses laid by different females hatched in 9 days at 26°C.

Seasonal distribution.—Specimens from Miller's Landing were collected

on 6 April 1976. Material from the two other locales was taken 24–26 March 1980.

Remarks.—Adults of *E. vizcaina* are distinguished from all other *Eupompha* by body color and the moderately dense cinereous setation. Also, it is the only *Eupompha* with males having inflated fore tarsi (Figs. 1, 8) but lacking a distinct cephalic sulcus (Fig. 1).

Eupompha decolorata is the only other *Eupompha* occurring in the Vizcaino Desert. The two are quickly separated by coloration. *E. decolorata* is bicolored. The elytra are orange, at least in part, and the rest of the body is blue-black. *E. vizcaina* is dark throughout. Also, the fore tarsi of males of *E. decolorata* are less modified (Fig. 10).

The first instar larva of *E. vizcaina* is almost identical to that of *E. edmundsi*. They are the only meloids known with clavacostate body setae (Figs. 11, 12; also, see Pinto, 1975). The two are separated by rather subtle features. In *E. vizcaina* the two claw setae (Fig. 7) do not arise from the same level as they do in *E. edmundsi* (Pinto, 1975, Fig. 3). Also, the terminal seta of the antenna (Fig. 13) is longer in *E. vizcaina* (60% longer than antennal segment III) than in *E. edmundsi* (subequal in length), and abdominal spiracles III–VIII are subequal in *E. vizcaina* but gradually decrease in size posteriorly in *E. edmundsi*.

Eupompha decolorata (Horn)

Calospasta decolorata Horn, 1894:437.

Eupompha decolorata: Pinto, 1979:414.

First instar larva.—Body uniformly brown, with long, heavy spiniform setae throughout. Head 30% wider than long, widest near level of eyes, sides gradually convergent to base; six setae between clypeus and frons (1st row behind labrum); gula about as wide as long, its setae inserted on anterior margin. Eyes with diameter 20–30% less than that of mesothoracic spiracles. Antennae with segment I ca. 75% wider than long; II slightly longer than wide, ca. 50% longer than I; III twice as long as wide, ca. 20% shorter than II; sensory organ slightly wider and longer than III; terminal seta twice as long as III. Mandibles slender, distinctly widened basally, feebly crenulate on inner margin; apical seta long, basal seta minute but usually distinct (ca. $\frac{1}{5}$ as long as apical seta). Maxilla with ca. 6 setae on mala; segment III of palpi ca. 35% longer than wide, asymmetrical, lateral margin distinctly longer than medial margin, sensory area with ca. 20 papillae, two-segmented appendix not evident and probably absent. Labium with setae of first prementum long, setae of second prementum $\frac{1}{3}$ as long; segment II of palpi slightly longer than I.

Thorax with line of dehiscence distinct on pro- and mesonotum, weakly expressed on metanotum; 24 setae on pronotal disk. Abdomen with pos-

terolateral margin of terga abutting against pleurites; spiracles placed in membranous area between pleurites and anterolateral margin of terga; first spiracle with diameter ca. 20% less than that of mesothoracic spiracle and twice the diameter of second spiracle; spiracles on segments II–VIII subequal in size; terga with posterior marginal row of setae ca. $\frac{2}{3}$ tergal length. Sternum with a pair of subtriangular sclerites on I–VIII, sclerites gradually increasing in size on posterior segments, sclerites on VIII partially fused medially or not; IX with a single, large sclerite. Legs slender, hind claw straight, curved slightly at apex, ca. $\frac{3}{4}$ as long as hind tibia; claws with their two setae separated at base by ca. $\frac{1}{10}$ claw length, longer seta reaching slightly beyond apical $\frac{1}{5}$ of claw. Body length 1.48 mm; caudal setae 0.62 mm (N = 5).

Material examined.—Larvae from eggs laid by a female collected in MEXICO, Baja California Sur, 39 km W San Ignacio, on *Malacothrix californica*. Eggs hatched 9 days after oviposition at 26°C.

Remarks.—The larva of *E. decolorata* is closest to that of *E. imperialis* and *E. elegans* and will key to the couplet separating these species in Pinto (1979). The larva of *E. elegans* was described by MacSwain (1956) and that of *E. imperialis* by Pinto (1975). *E. decolorata* is distinguished from *E. imperialis* primarily by eye size. In *E. imperialis* the eyes are large. Their diameter is subequal to that of the mesothoracic spiracles. In *E. decolorata*, as in *E. elegans*, the diameter of the eyes is 20–30% less than that of the mesothoracic spiracles.

Eupompha decolorata is best separated from *E. elegans* by structure of the hind claw, size of the abdominal spiracles and the length of the terminal seta of the antenna. In *E. elegans* the longest seta on the hind claw reaches beyond the apical $\frac{1}{10}$ of the claw (Pinto, 1975, Fig. 4); in *E. decolorata* it only approaches the apical $\frac{1}{5}$. The abdominal spiracles decrease in diameter posteriorly in *E. elegans*; in *E. decolorata* they are subequal on all segments posterior to II. The terminal seta is ca. 3× as long as segment III of the antenna in *E. elegans*; it is only 2× as long in *E. decolorata*.

Additional records.—The recent treatment of *E. decolorata* (Pinto, 1979) includes only five locality records, the type locality (Calimalli Mines), the questionable inclusion of specimens from south of San Miguel Comondu, and three locales within 25 mi. N of Punta Prieta. Additional records are as follows: BAJA CALIFORNIA NORTE: Bahia de Los Angeles, 25 mi. W; El Crucero. BAJA CALIFORNIA SUR: Guerrero Negro, 51 km SE; Rancho San Jose Castro (Vizcaino Peninsula), 25 km E; San Ignacio, 39 km W; Vizcaino, 56 km W. This additional material was collected between 24 March and 4 April.

Courtship Behavior in *E. decolorata* and *E. vizcaina*

The courtship of seven species of *Eupompha* was described earlier (Pinto, 1977). Courtship in *E. decolorata* and *E. vizcaina* is similar to that of most

Eupompha. The male performs all precopulatory behavior from a mounted position directly above the female. Display consists of antennation and tarsal rubbing. The male antennae direct those of the female onto the frontal area of his head capsule and the fore tarsi stroke her maxillary palpi. Bouts of display are highly variable in duration, lasting from one second to a minute or more. Most bouts last less than 30 sec. Periods of display alternate with genital insertion attempts, during which the male tries to copulate, or with short periods of relative quiescence (dorsal riding). Although courtship display is similar in both species the activities are performed differently.

Descriptions of behavior are based on laboratory studies and observations in the field of very short duration. In *E. vizcaina* 10 pairs were observed for a total of 3 hours; in *E. decolorata* 4 pairs were observed for a total of 1 hour.

E. decolorata.—Antennation dominates courtship display. Each male antenna is loosely curled around the corresponding antenna of the female and both are kept in this position during the entire antennation bout. The male rapidly shifts his body from side to side contacting first one and then the other female antenna with the front of his head. In this species contact of each female antenna with the male head is apparently made both by a slight pulling by the antenna and, more importantly, by his head moving to meet it. The mean rate that each antenna contacted the male head at 25°C in one pair was 1.4 sec (1.3–1.5) (N = 3).

During antennation the fore tarsi are directed medially, venter up, and are either held adjacent to one another or overlap slightly. They usually remain motionless under the cervical area of the female. Most bouts of display consist of antennation only. In a minority of bouts, however, the tarsi quickly move forward in unison and brush the maxillary palpi of the female (1–several times?) with the ventral surface of the tarsal segments.

Bouts of display are usually followed by genital insertion attempts. If unsuccessful, the male either dismounts or continues display.

E. vizcaina.—Behavior in *E. vizcaina* is similar to that in *E. decolorata* but with two important differences. Males of *E. vizcaina* do not move the head from side to side to meet the female antenna. Instead, the head capsule is stationary and each female antenna is pulled to the frontal area solely by the corresponding male antenna as in *E. fissiceps* (Pinto, 1977, Fig. 5). The second difference is that during tarsal rubbing the fore tarsi are not in contact and do not stroke the female's maxillary palpi in unison. Instead, each is directed ventromedially, and moves independently and often alternately. As in *E. decolorata*, however, it is the venter of the fore tarsus that contacts the female's palpi.

Antennation and tarsal rubbing are typically concurrent in *E. vizcaina*. However, the rate of tarsal rubbing is ca. twice that of antennation. In a single bout observed at 29°C each antenna was contacted by the male head

capsule $0.7 \times / \text{sec}$. Concurrent tarsal rubbing contacted each female palpus $1.4 \times / \text{sec}$. Rarely, antennation occurs without tarsal rubbing. This typically occurs when the female is feeding.

The male genitalia are usually extruded during display and probe the dorsum of the female. After most lengthy bouts of display the male moves back slightly and attempts to insert regardless of female receptivity. If failing to insert, the male either decamps or continues its display.

Three matings were observed. All followed a single bout of display lasting 30–40 sec. Males moved to a linear position within 2 min. after insertion and remained coupled a mean of 2.17 (2.1–2.2) hours at 26°C.

Discussion

The placement of *E. vizcaina* in Section I of *Eupompha* is clearly indicated by the modification of the ventral surface of the male fore tarsus, the elongate ventral spine of the aedeagus, and the 6 setae on the frontoclypeus and the asymmetrical segment III of the maxillary palpi in the first instar larva. The explanate outer hind tibial spur in *E. vizcaina* is unique within Section I of *Eupompha* (Fig. 2). In other species it is spiniform or stick-shaped and either similar to the inner spur (Fig. 3) or only slightly wider (Fig. 4).

Assignment of this species to the Viridis Group is indicated by the similarity of its first instar larva to that of *E. edmundsi*. The only adult feature suggesting relationship to *E. edmundsi* is the relatively dense body setation. This character as well as the presence of clavacostate setae in the larva of both are unique within *Eupompha*. The placement of *E. edmundsi* with *E. viridis*, the only other member of the group, was based on the slightly clavate ventral spine of the aedeagus (Pinto, 1979). In *E. vizcaina* the spine is not obviously clavate (Fig. 6). The only features shared by *E. vizcaina* and *E. viridis* are probably primitive within the genus (e.g., short, non-tapering antennae; relatively subquadrate head; bulged eyes). Until the currently unknown larva of *E. viridis* is described, the relationship of this species to the others in Section I will remain questionable.

Unlike the other members of the Viridis Group, *E. vizcaina* has a highly developed courtship display. Both structure and associated behavior are unique within *Eupompha*. Like members of the Elegans Group and unlike those in Section II, it is the venter rather than the dorsum of the fore tarsus that is used in tarsal rubbing. It is distinct from Elegans Group species, however, in that the tarsi work independently and the ventral surface of segment I is glabrous rather than setate (Figs. 8, 10). Although antennation is well developed in *E. vizcaina*, males lack the distinct cephalic sulcus of the Elegans Group. This shows that the absence of overt structural modification is not always correlated with the absence of behavior. Furthermore, the relationship of *E. vizcaina* to *E. edmundsi*, a species without well defined

display (Pinto, 1977), suggests that both tarsal rubbing and antennation evolved independently within Section I and at least three times within the genus.

Larval anatomy and courtship behavior show *E. decolorata* to be closely related to *E. elegans* and *E. imperialis* as previously suggested by adult structure (Pinto, 1979). Courtship behavior in all three species is basically the same. The only difference in *E. decolorata* is the relative infrequency of tarsal rubbing. Interestingly, the male fore tarsi are only slightly modified in this species compared to those in *E. elegans* and *E. imperialis* (Fig. 10 below and Fig. 17 in Pinto, 1977).

Acknowledgments

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Footnotes

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² Mean \pm standard error.